for a period of three years in the first instance. The Syllabus showing the course of studies proposed together with the additional establishment required to open the classes as shown in the annexure is approved. The Director of Public Instruction is requested to arrange, in consultation with the Chief Engineer, for the opening of the class immediately as also for the selection of the candidates for admission to the class from those who have successfully gone through the first year's course of the Sub- Overseers' Class and obtained high marks in drawing. The number of students to be admitted to the class may be limited to a maximum of ten as stated in the Public Works Secretary's Note.

3. The allowances recommended for the existing School Staff and the employment of part-time Lecturers are also approved. The selection of outside Lecturers may be made in consultation with the Chief Engineer. The cost on account of the opening of the Draftsmen's Class during the current year including the above allowances is reported to come to about Rs. 2,300 nearly. Half of this amount will be met from the grants for the Krishnarajasagara Works and the other half from the general savings under "23 Irrigation and 24 Civil Works" of the Public Works Department grants.

4. The Public Works Secretary notes that the scale of pay of the Draftsmen has not been revised for over 11 years and that this service compares very unfavourably with that for the Sub-Overseers and that that is also one of the reasons for the service being unattractive. Proposals for the revision of the scale may be submitted separately by the Chief Engineer for orders of Government. All passed students from this class should be absorbed in the Public Works Department against permanent vacancies.

R. RANGA RAO,
General Secretary to Government.

STATEMENT OF THE APPROXIMATE COST OF OPENING A DRAFTSMEN'S CLASS.

ANNUAL RECURRING EXPENDITURE.

Staff.—		Rs.	
One Instructor in Drawing and Estimating	...	75—10—125 or average 108·3.	
One Peon	..	11	
Duty allowance to the Superintendent	...	35	
Do Civil Engineering Assistant	...	30	
Do do Master	...	20	
Do Clerk ..	...	10	
Total	...	214·3	or Rs. 2,571 annually.

	Rs.
Part-time Lecturers in Applied Mechanics, Graphic Statistics	360
Do Architecture ...	360
Drawing Materials, stationery, etc. ...	150
Purchase of Drawing Papers, drawing printed books	30
Contingencies for chalk, dusters, etc. ...	20
Charges for short tours within the Province	100
Total ...	300

FURNITURE AND INSTRUMENTS.

Initial Expenses.—

Blackboard with stand 1 at Rs. 25	...	25
Teakwood Tables (drawing) with drawers and lock and key 10 at Rs. 35	...	350
Teakwood high stools 10 at Rs. 5	...	50
Table for Instructors 2 at Rs. 25	...	50
R.W. Arm (Rattan) Chairs for Instructors 2 at Rs. 12	...	24
Drawing boards big size 10 at Rs. 28	...	280
Total	...	779

ANNEXURE.

Memo on the constitution and working of the Draftsman Class proposed to be opened in the School of Engineering, Bangalore, on the lines suggested by the present Chief Engineer.

The course shall extend over three years of which, the first year will be spent in the First Year Class of the Civil Engineering Section, which shall be preliminary to the Draftsman Course. After the second terminal examination of the First Year Civil Class, a selected number of students (who have shown a special aptitude for drawing) ordinarily not exceeding ten in number preference being given to the Non-Brahmins will be promoted to the Draftsman Class. In this class, special training will be given for two years in Drawing and Estimating, besides, lectures on other important subjects such as Elementary Portions of Architecture, Materials and Construction, Hydraulics and Irrigation.

2. With regard to tuition fees, deposits, qualification for admission, scholarship-freeship, leave, discipline, examination, etc., rules pertaining to the present Civil Engineering Section will apply.

3. In the last two year's course, terminal examinations will be held in the months of December and April as in the case of other classes in the School and the final examination by the Government Board of Examiners at the end of the Course.

4. The subjects of study in the last two years and the marks assigned to each shall be as follows :—

Subjects	Marks		Total
	Practical	Examination	
I Engineering.—			
Materials and Construction including Elementary portions of Architecture.	..	50	..
Elementary portions of Irrigation work and Hydraulics.	..	50	..
Applied Mechanics and Graphic Statistics.	..	50	150
II Drawing.—			
Building	40	75	..
Bridge	40	75	..
Irrigation	80	0	410
III Estimating.—			
Building	30	90	..
Bridge	30	90	..
Irrigation Works ..	40	100	380
Physical Exercises, Attendance and General Behaviour.	60	..	60
Total ..	320	680	1,000

Practical marks will be awarded for class work.

To secure a pass, a student should obtain 40 per cent of marks in each group and 50 per cent of the grand total. Those who obtain not less than two thirds of the maximum will be declared to have passed in the First Class and the rest put in the Second Class.

5. Two prizes of the value of Rs. 10 each will be awarded every year to the First and Second students in the Second and Third Year Classes.

6. On the completion of the course, a certificate signed by the Superintendent of the School and countersigned by the President of the Managing Committee shall be issued, stating that the student has passed the final examination and is qualified for employment as a Draftsman.

SYLLABUS.

DRAFTSMAN CLASS.

First Year Course (combined with First Year Civil Engineering Class.)

MATHEMATICS GROUP.

(1) *Plane Trigonometry.*—Measurement of angles in degrees and radians. Definitions of sine, cosine, etc., and graphic determination of their value. Setting out angles from values of sine, cosine, etc. Use of tables of natural sines, cosines, etc. Solution of right angled triangles by calculation and drawing and simple applications to heights and distances.

(2) *Mensuration.*—Determination of sides and perimeters of right angled triangles. Rules for finding out lengths of circumference of a circle and arcs of segments and sectors. Determination of areas of triangles, parallelogram, circles, sectors and segments of circles, ellipses and of irregular plane figures by middle ordinate and Simpson's rules. Determination of surfaces and volumes of prisms, pyramids, cylinder, cone sphere, zones of sphere and rings. Volumes of irregular solid by plotting ordinates representing areas of cross sections. Estimation of areas, surfaces and volumes from actual measurements of objects. Measurements of areas and volumes by weight or displacement. Meaning of specific gravity. Practical rules for measurement of timber. Calculation of the weight of a body when its volume and specific gravity are known. Capacity of a given cask.

ENGINEERING GROUP.

(1) Building materials and construction :—

(*a*) Bricks, tiles and stones. Dimensions and characteristics of good bricks, tiles and stones.

(*b*) Lime, mortar, cement, etc. Slaking lime, preparation of mortar, plaster, white and colour wash and concrete of lime, surki and cement, paints and varnishes, distempers.

(*c*) *Masonry.*—Bricklaying in English and Flemish bonds. Bond at angles of wall in footings at the junction of main and cross walls at door and window openings and in circular pillars. Foundation and footings wood, bricks and plugs.

(2) EARTHWORK AND ROADS.

(*a*) Setting out embankment and cuttings from cross sections on level and sloping grounds. Profiles and modes of forming embankments. Formation of tank bunds. Use of puddle, protection of slopes by turfing or stone pitching drainage of slopes. Computation of contents of earthwork by mean areas and prismoidal formula.

(*b*) Survey, section, formation and maintenance of roads in plains.

SURVEYING GROUP.

(*a*) *Chain, Compass and Plane Table.*—Ordinary surveying with chain compass and plane table. Inaccessible points. Obstructed lines. Use of optical square and cross staff.

(*b*) *Level.*—Manipulation and adjustment of levels. Levelling.

DRAWING GROUP.

(*a*) *Printing and Freehand and Model Drawing.*—Freehand drawing. Printing and drawing from models No. (1).

(*b*) *Geometrical Drawing.*—Use of drawing instruments and scales. Simple problems relating to lines, triangles, quadrilaterals, polygons, circles and tangents. Inscribed and circumscribed figures (No. 1).

(*c*) *Machine Drawing.*—Ability to copy accurately to scale and supply additional views of simple machine details from sketches and measurements; *viz.*, rivets of different forms. Rivetted joints, formed by lap, butt, angle and T-irons, screws, bolts and nuts (No. 1.)

(*d*) *Building Drawing.*—Masonry detail, brick bonds, arches over doors and windows, footing and foundations, doors and windows and timber joints. Construction of scales. Drawing plan, elevation, section from sketches, measures of a small building (No. 2.)

ESTIMATING GROUP.

(*a*) Rules for taking out quantities of roofing, flooring, wood work, iron works, doors and windows, arches, etc.

(*b*) Rules for deductions.

(*c*) Calculations of probable quantities of each kind of material required for a work.

(*d*) Taking out quantities and framing estimates from drawings of a small structure such as a village school and a road culvert (2 Estimates.)

SECOND YEAR COURSE.

ENGINEERING GROUP.

(1) Materials and Construction:—

(*a*) *Timber.*—Characteristics of good timber.

(*b*) *Masonry.*—Opening for timber beams, brick arches up to 6' span flat, segmental, semicircular and relieving. Centres for small arches. Plastering with mortar, stair cases.

(*c*) *Foundations.*—Methods of calculation.

(*d*) *Roofs and Floors.* Terrace roofs, jack arch roofs, gable roofs, rafters, purlins and reeper, King and Queen Post Trusses. Common and Mangalore Zinc sheet roofing, tiled roofs. R. C. roofs and floors, brick, Mangalore tile, Cudappa and concrete floors.

(*e*) Emperical formula, for finding dimensions of beams, joists, rafters and bressummers, etc., and use of engineering hand books.

(2) *Bridges.*—Brief notes on different kinds of bridges, their parts and foundations.

DRAWING GROUP.

(*a*) *Topographical Drawing.*—Conventional signs, map drawing, representation of ground by contours. Section on contour plans (No. 1.)

(*b*) *Building Drawing.*—Drawing plan, elevation and sections of any Government Office (small size) or educational institution from sketches and measurements (No. 2.)

(*c*) *Machine Drawing.*—Pipes and pipe joints and machine foundations (No. 1.)

(*d*) *Bridge Drawing.*—Road culvert and a masonry arch-bridge from sketches and measurements (No. 2).

(*e*) *Road or Canal Sections.*—Plotting from levelling field books or copying old sections (No. 1).

(*f*) *Irrigation Drawing.*—Tank bund sections with a sluice and a weir (one for a minor tank and one for a major tank.)

General.—All drawings to be inked and finished properly. Students to be taken out for taking sketches and measurements of different structures.

ESTIMATING GROUP.

Irrigation.	1.	Earthwork to a tank bund, a tank sluice and a tank weir (No. 1.)
	2.	Earthwork to a portion or road or canal in cutting and embankment (1.)
Building.	3.	A dwelling house and two small office buildings (No. 3.)
Bridge.	4.	A masonry bridge (No. 1.)

General.—All estimates to be inked and completed with local rates.